

WHAT IS CLAIMED IS:

1. A magnetic memory device comprising:

a first wiring;

5 a second wiring intersecting three-dimensionally with said first wiring; and

a storage cell positioned at an intersecting area of said first wiring and said second wiring for writing/reading information of a magnetic spin, wherein:

10 a sidewall portion of said second wiring electrically connecting to said storage cell has a forward tapered shape having a contact angle relative to an upper surface of said storage cell being 45 degrees or more.

2. The magnetic memory device as cited in claim 1, wherein:

15 said storage cell is a magnetoresistive effect device including a stacked structure comprising an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, and a ferromagnetic free layer.

3. The magnetic memory device as cited in claim 1, wherein:

20 said storage cell is the one in which said non-magnetic spacer layer is a tunnel barrier made of an insulator; and said two ferromagnetic layers and said non-magnetic spacer layer located between said two ferromagnetic layers form a magnetic tunnel junction.

4. The magnetic memory device as cited in claim 1, wherein:

25 said storage cell is a magnetoresistive effect device including a stacked structure comprising a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, and a protecting layer in this order from bottom.

5. The magnetic memory device as cited in claim 1, wherein:

30 said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

6. The magnetic memory device as cited in claim 1, wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, a non-magnetic spacer layer, a ferromagnetic fixed layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

7. A method of manufacturing a magnetic memory device comprising the steps of:

a step of forming a first wiring;

a step of forming a stacked film for forming a storage cell for writing/reading information of a magnetic spin on said first wiring through an insulating film;

a step of forming a resist pattern on a area where said stacked film for said storage cell is formed;

a step of forming said storage cell by patterning said stacked film using etching using said resist pattern as a mask;

a step of forming an insulating layer on said storage cell while said resist pattern is left;

a step of forming an opening on said storage cell by removing said insulating layer formed on said resist pattern together with said resist pattern; and

a step of forming a second wiring three-dimensionally intersecting with said first wiring, and

a storage cell positioned at an intersecting area of said first wiring and said second wiring, wherein:

a sidewall portion of said second wiring has a forward tapered shape having a contact angle relative to an upper surface of said storage cell being 45 degrees or more.

8. The method of manufacturing a magnetic memory device as cited in claim 7, wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising an antiferromagnetic layer, a ferromagnetic

fixed layer, a non-magnetic spacer layer, and a ferromagnetic free layer.

9. The method of manufacturing a magnetic memory device as cited in claim 7, wherein:

5 said storage cell is the one in which said non-magnetic spacer layer is a tunnel barrier made of an insulator; and

said two ferromagnetic layers and said non-magnetic spacer layer located between said two ferromagnetic layers form a magnetic tunnel junction.

10 10. The method of manufacturing a magnetic memory device as cited in claim 7, wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, and a protecting layer in this order from bottom.

15 11. The method of manufacturing a magnetic memory device as cited in claim 7, wherein:

20 said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

12. The method of manufacturing a magnetic memory device as cited in claim 7, wherein:

25 said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, a non-magnetic spacer layer, a ferromagnetic fixed layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

13. An integrated circuit device of magnetic memory device comprising:

30 a first wiring;

a second wiring three-dimensionally intersecting with said first

wiring; and

a storage cell positioned at an intersecting area of said first wiring and said second wiring for writing/reading information of a magnetic spin, wherein:

5 a sidewall portion of said second wiring has a forward tapered shape having a contact angle relative to an upper surface of said storage cell being 45 degrees or more.

14. The integrated circuit device of magnetic memory device as cited in claim 13, wherein:

10 said storage cell is a magnetoresistive effect device including a stacked structure comprising an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, and a ferromagnetic free layer.

15. The integrated circuit device of magnetic memory device as cited in claim 13, wherein:

15 said storage cell is the one in which said non-magnetic spacer layer is a tunnel barrier made of an insulator; and

said two of ferromagnetic layers and said non-magnetic spacer layer located between said two ferromagnetic layers form a magnetic tunnel junction.

20 16. The integrated circuit device of magnetic memory device as cited in claim 13, wherein:

25 said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, and a protecting layer in this order from bottom.

17. The integrated circuit device of magnetic memory device as cited in claim 13, wherein:

30 said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

18. The integrated circuit device of magnetic memory device as cited in claim 13, wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, a non-magnetic spacer layer, a ferromagnetic fixed layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

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